Before the
Federal Communications Commission
Washington, DC 20554

In the Matter of	)	
Digital Audio Broadcasting Systems	)	MM Docket No. 99-325
And Their Impact on the Terrestrial Radio	)	
Broadcast Service	)	

COMMENTS OF VISTEON CORPORATION

Visteon Corporation ("Visteon") hereby submits these comments in response to the Federal Communications Commissioner's public notice request for comments on the NRSC report *Evaluation of the iBiquity Digital Corporation (iBiquity) IBOC System, Part I – FM IBOC,* and the iBiquity Digital Radio Corporation report *FM IBOC DAB Laboratory and Field Testing*. Public Notice, *Comment Sought on National Radio Systems Committee DAB Subcommittee's 'Evaluation of the iBiquity Digital Corporation IBOC System,'* MM Docket No. 99-325, DA 01-2932 (Dec. 19, 2001).

Introduction

Visteon is a major manufacturer of automotive electronics and systems and the second largest manufacturer of automotive radios in the world. Visteon places about five million new radio receivers in automobiles each year. The automobile remains the principle place that audio broadcast services are used in the United States, and digital audio broadcast has the potential of significantly enhancing the listening experience of the driving public.

Visteon is currently developing IBOC receivers for use by automotive manufacturers. Visteon is targeting availability of these receivers to allow automotive manufacturers to offer them in their vehicles starting in the 2004 or 2005 vehicle model year. Visteon recently demonstrated an early IBOC receiver prototype at the 2002 Consumers Electronics Show.

Under the provisions of a Strategic Alliance Agreement between Visteon Corporation and iBiquity Digital Corporation, Visteon receives financial compensation from iBiquity, including ownership in iBiquity, in return for assistance in the commercialization of IBOC technology with respect to automotive AM/FM radios.

Positive Impacts of IBOC

While traditional analog AM and FM broadcasting has long provided listeners with a wide array of content, wide coverage, and good signal quality, it also has limitations, especially in the mobile environment of a vehicle. Most significant in these limitations are disturbances due to fading, noise, and interference, and limited audio fidelity. Due to various mechanisms that are

present in the IBOC broadcast and reception system, IBOC has the potential of significantly reducing the effects of these disturbances. IBOC will also allow a significantly wider audio bandwidth and better overall audio quality to greatly enhance fidelity. These performance improvements have been demonstrated by iBiquity in various venues in the past and as part of the testing described in the subject reports.

The quality of AM and FM mobile reception is a key concern for automotive manufacturers, and also Visteon as a supplier to these manufacturers. It directly impacts the listening experience of vehicle occupants, and automotive manufacturers receive both positive and negative feedback on reception quality from their customers. Therefore, reception improvements such as those obtainable with IBOC are very desirable to end customers, automotive manufacturers, and receiver manufacturers.

Today's digital multimedia technology and products, such as MP3 and the emerging satellite radio, provide a combination of high-quality digital audio and information describing the audio material. The song title is an example. The basic IBOC waveform contains this information within the coded audio stream, so that FM, a traditional source of entertainment and information, especially in a mobile setting, can provide this information also.

Analysis of NRSC and iBiquity Reports

As evidenced by the NRSC report, iBiquity, the NRSC, and supporting parties have conducted a wide breadth of testing and analysis on the FM IBOC system. The testing was very complete and covered laboratory and field testing, objective and subjective testing, a variety of test locations, and all key reception scenarios.

Laboratory Testing

Subjective listening tests of a desired IBOC channel, using CD source material (music and speech), showed that IBOC can significantly improve reception performance in the presence of channel various impairments. In particular, multipath reduction will be a key benefit of the IBOC system.

Complete host compatibility must be a basic requirement for IBOC. The results show no degradation of the analog host when IBOC digital sideband modulation is added.

Laboratory testing with tone modulation showed various levels of SNR degradation in the presence of an IBOC first adjacent channel, with some degradation as much as 20 dB for higher adjacent levels. Also, results for subjective listening to CD source material with laboratory-generated IBOC first adjacent channel also show significant degradation for signal quality. The results from these two tests imply that some listeners that have acceptable reception of a favorite channel, where that channel currently has a non-IBOC first adjacent, may find reception of their favorite channel significantly impaired when the broadcaster of the adjacent channel begins IBOC transmission. Because this will be a significant and immediate change for the listener, he may assume that either his radio or vehicle has become defective and requires repair or replacement. This could result in vehicle owner dissatisfaction, and cost to automotive manufacturers and radio manufacturers for diagnosing, and possibly incorrectly replacing or attempting to repair the radios involved.

The concern about degradation due to a first adjacent IBOC signal must be viewed realistically in light of the probability of this scenario occurring. First, the report is correct in stating that field tests produce results that correlate more closely than laboratory tests (especially with tone modulation) to the listening experiences of end-users, and therefore the field test results should be weighed more heavily than the lab results in the overall conclusions. Second, the report's solid statistical analysis indicates that a fraction of a percent of listeners might be affected by a first adjacent switching from analog to IBOC broadcasting. However, it should be noted that radio reception concerns from customers occurring even at a fraction of a percent rate can be very significant to automotive manufacturers and receiver manufacturers because of the large overall volumes of radios involved (those sold each year and already in the field). Mitigation of this potential issue may require automotive manufacturers to implement appropriate informational programs about IBOC at dealerships and other points of contact with their customers.

Field Coverage

IBOC field coverage testing encompassed a thorough set of broadcast locations, routes and radials from those locations, and multipath and interference situations. The results show good coverage of the existing analog coverage areas. On the average, IBOC was successfully received over the same coverage areas where analog reception would be considered clear or mostly clear (based on received signal levels only and excluding interference). IBOC coverage was roughly 70% of analog coverage if analog coverage is assumed to include fringe areas where high-performance radios, such as typical automotive radios, will have some audible noise and/or interference due to lower received signal levels. And, in general, IBOC provided clean, non-blended digital audio reception over large coverage areas. Towards the edges of those areas, where blending to analog began due to impairment of the digital part of the signal, analog reception was also impaired to some degree.

Listening Tests from Field Recordings

Subjective listening of recordings from the field testing showed that IBOC gave significant performance improvements under all the tested multipath and interference situations and with a variety of music and speech content. Besides showing the coverage capability and robustness of IBOC, these results imply that IBOC may increase coverage in some instances depending on how much IBOC's multipath and interferer reduction allows a listener to stay tuned to a station he or she would otherwise turn off.

It is interesting to note that even though the IBOC broadcast signal is intentionally wider than a typical analog signal, IBOC provided better performance than the analog radios in the presence of a first adjacent interferer, at least for the range of D/U levels tested. This was presumably due to IBOC's use of upper-sideband, lower-sideband redundancy in the broadcast signal, and thus demonstrated one of IBOC's advantages over analog FM. However, today's higher-end automotive radios that use advanced techniques for channel filtering can also give good reception performance even with negative D/U ratios, so at least in the case of these types of radios, the improvement in first adjacent rejection may not be as pronounced with IBOC.

Conclusions and Recommendations

- IBOC will provide significant audio and data reception benefits to consumers, especially in the vehicle environment.
- Visteon supports the NRSC's conclusions regarding IBOC performance, coverage, and compatibility.
- Visteon recommends that the Commission proceed with the selection and endorsement of the iBiquity IBOC standard as the in-band digital radio broadcast solution for the US.
- Visteon calls attention to the potential negative impact of IBOC on the existing FM broadcast environment in the form of first adjacent interference, that this potential issue is outweighed by the potential benefits of IBOC, and that mitigation of this potential issue may require automotive manufacturers to implement appropriate informational programs about IBOC at dealerships and other points of contact with their customers.

Respectfully submitted,

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Dated: March ___, 2002